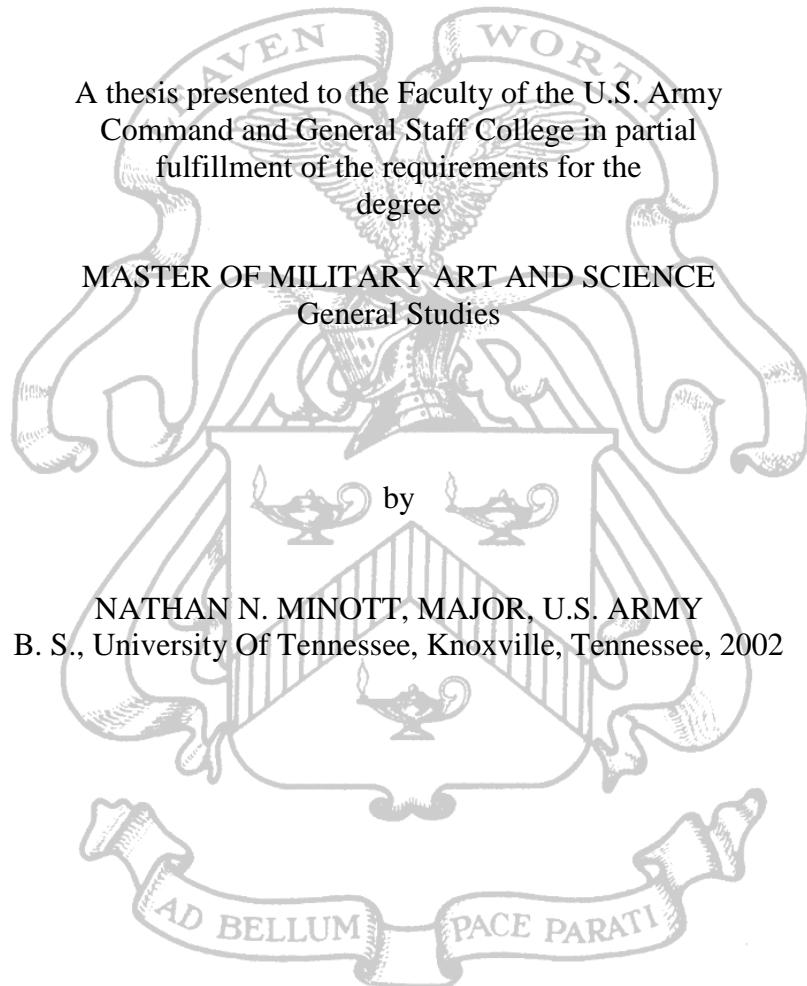


THE NECESSITY OF COMPANY-GRADE AIR DEFENSE ARTILLERY  
OFFICERS IN THE AIR DEFENSE AND AIRSPACE  
MANAGEMENT CELLS WITHIN THE  
BRIGADE COMBAT TEAM



Fort Leavenworth, Kansas  
2014-01

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

THE NECESSITY OF COMPANY-GRADE AIR DEFENSE ARTILLERY OFFICERS IN THE AIR DEFENSE AND AIRSPACE MANAGEMENT CELL WITHIN THE BRIGADE COMBAT TEAM, by Major Nathan N. Minott, 87 pages.

The Army assumed risk in 2003 when it divested all but two short-range air defense battalions and invested in the air defense and airspace management (ADAM) cell. The role of the ADAM cell is to provide a common airspace operating picture, encompassing early warning, management of airspace and planning for aviation and air and missile defense. Central to a functioning ADAM cell is the officer in charge (OIC). The manning and training of the ADAM cell OIC has been the most troubled area of the ADAM cell staff. This study assesses how the Air Defense branch trains and prepares junior company-grade officers to fulfill the role of ADAM Cell OIC. Utilizing the Army design methodology, the study compares the current training and performance of Air Defense officers to the desired end state as defined by current doctrine. The study identifies four issues that stifle progress towards the Army's desired end state. As a result, the study invalidates the need for an ADAM cell OIC because of the tremendous cost in time, training, doctrinal adjustments and capability development required to achieve the desired capability of the ADAM cell OIC.

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## ACRONYMS

AAGS	Army Air-Ground System
AAMDC	Army Air and Missile Defense Command
ABCT	armored brigade combat team
AC2	airspace command and control
ADA	Air Defense Artillery
ADAM	air defense and airspace management
ADCCC	Air Defense Captains Career Course
ADSI	air defense system integrator
ALDS	Army Leader Development Strategy
AMD	air and missile defense
ATP	Army Techniques Publication
BAE	Brigade Aviation Element
BAO	brigade aviation officer
BCT	brigade combat team
FAAD	forward area air defense
HRC	Human Resources Command
IBCT	infantry brigade combat team
IFPC	interdict fires protection capability
IPB	intelligence preparation of the Battlefield
MCTP	Mission Command Training Program
NCO	non-commissioned officer
OC	observer-controller
OIC	officer in charge

SBCT	Stryker brigade combat team
SHORAD	short-range air defense
TACS	Theater Air Control System
UAS	unmanned aerial systems
UAV	unmanned aerial vehicles

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## CHAPTER 1

### INTRODUCTION

#### Overview

The recent trend in leader development appears to focus on preparing leaders to be adaptive in the face of rapid change and uncertainty. The Army incorporated the trend in the publication of the Army Leader Development Strategy. A strong case can be made that experiences in the past twelve years at war and the uncertainty for future conflicts has encouraged the investment in adaptability. The wars in Iraq and Afghanistan evolved into fights that had not been anticipated. Organizations were capable of adapting to their specific environments with relative advantages gained with the available personnel, training, and equipment. On the precipice of transition to a “post-war” military, the Army is at the optimal point to make adjustments to form and function that can be rapidly adapted to face virtually any enemy.

In April 2013, Brigadier General Donald Fryc, Air Defense Commandant, asked whether the Air Defense Artillery (ADA) branch was “training the right skill sets” for the employment of future capabilities (Fryc 2013). The question equally applies to the issues surrounding one of the most prominent contributions the ADA branch has provided to operations in Afghanistan and Iraq. The proliferation of air assets operating in the brigade combat team’s (BCT) airspace made airspace situational awareness critical.

The air defense and airspace management (ADAM) cell was to provide the BCT commander with a partial compliment of air defense capability and the ability to command and control airspace below the coordinating level. Unfortunately, in the ten years since the implementation, there have been repeated reports of underutilization a

general inability to execute core competencies associated with the function of the ADAM cell. This led to numerous changes and adjustments to the way the ADAM cell officer in charge (OIC) is prepared, assigned, and utilized.

The study will identify the doctrinal task and purpose for the ADAM cell OIC in order to determine the training requirements for that position. This study will review the changes that occurred within the ADAM cells of BCTs over the course of the last ten years. It will review the current missions and purposes of the ADAM cell and the OIC. The study will also assess the reports of what tasks company-grade ADA officers conducted while deployed with BCTs.

As a result, the study will recommend changes to the ADAM cell that will prepare the ADA branch to better serve the ground combat commander as well as changes to the professional development of company grade officers within the ADA branch.

### Background

The ADA branch transformed significantly during the Army's transition to modularity. Short-range air defense (SHORAD) battalions were inactivated to allow for the increased number of brigade combat teams in the Army (Congressional Budget Office 2005). The direct and general support these units provided to divisions and brigades were eliminated from the active component. Meanwhile, staff positions in infantry, armor, and Stryker brigades grew to include an ADAM cell. This cell would ensure the organization was capable of planning and coordinating operations if short-range air defense units were task organized based on mission requirements. Additionally, the cell was intended to coordinate and deconflict an increasingly congested airspace below the coordinating altitude (Department of the Army 2013a).

After implementation, these cells received both positive and negative reviews. Early articles touted the flexible nature of an ADAM cell and its ability to provide the BCT with an abundance of information (Mace 2003). Lately, more articles have discussed the poor adaption of the ADAM cell and the need to correct serious deficiencies. BCTs are still struggling with the integration of the ADAM cells years later (Futscher 2013a).

Assessments by observer-controllers (OCs) at training centers and the Mission Command Training Program (MCTP) indicated officers assigned to ADAM cells did not receive adequate training and development prior to their assignment. These observations can be seen as early as 2008 (Corby 2008).

In 2012, the ADA assignment officers shifted the ADAM cell assignments from junior captains to post-command captains. This was an attempt to ensure the best and brightest individuals were being placed in the BCTs (United States Army Human Resources Command 2013). It has been ten years from the first implementation of this six-person team into a BCT and the experience gap still has not gone away (Dohogon 2013; Futscher 2013b). OCs continue to report ADAM cell OICs have a poor understanding of key airspace management core competencies and unified land operations. The poor understanding of unified land operations may be the effect of the ADA branch's increased separation from the maneuver force. But that does not explain why ADAM cell OICs are not completely competent in airspace command and control.

Published assessments indicated company-grade officers need emphasized training on unified land operations prior to their assignment to ADAM cells (Futscher 2013). This would indicate emphasis is being placed elsewhere. Logically, the training

that does receive adequate focus must be of substantial importance within air defense units and substantially different from that of the BCT. If that assumption is true, then several issues surface. For instance, what benefit is there for a company-grade ADA officer to serve in an ADAM cell?

#### Study Significance

The direct significance of this study could assist in better enabling the integration of ADA officers into the ADAM cell. This study could also assist in modifying the training and professional development of junior officers. Additionally, this study has the potential to assess the recent ability for the ADA branch to develop adaptable officers.

#### Primary Research Question

Does the ADA branch prepare ADA captains to manage the airspace domain within the BCT with the current organization construct and lack of new systems given the training, operational, and institutional constraints?

#### Secondary Research Questions

What was the impetus for the development of an ADAM cell?

What are the current doctrinal purpose, missions, and capabilities of the ADAM cell within the BCT?

How are company-grade ADA officers being trained in preparation for assignments to ADAM cells?

What are the actual roles company-grade ADA officers fulfill within the BCT?

Are company-grade ADA officers being effectively employed as ADAM cell OICs?

Does the Army need to keep the ADAM cell OIC?

### Assumptions

This study makes several assumptions in order to maintain logic throughout. The primary assumption that the study makes is that the need to coordinate airspace is essential to the synchronization of air assets within the BCT's area of operations; several factors contribute to this assumption. First, the synchronization of fires is an important factor to ensure the commander is capable of massing all available assets on the enemy. Second, in order to accomplish this task, the staff must have and maintain situational understanding of elements operating within the BCT's airspace.

The next assumption the study makes is that SHORAD assets will not become organic elements within the three standard BCTs: infantry BCT (IBCT), armored BCT (ABCT), and Stryker BCT (SBCT). The man-portable Stinger, Avenger, and Interdict Fires Protection Capability (IFPC) will remain capabilities that are aligned to Army Air and Missile Defense Command (AAMDC) in the active component, but they will remain primarily in the reserve component.

The final assumption is the mission command warfighting function will continue to strive toward a common operating picture for the commander. Integrated mission command systems across all warfighting functions will be the primary means for the mission command warfighting function to meet this challenge.

### Limitations

Time, scope, and security are the three major limiting factors of the study. The one year in the Command and General Staff College prevents conducting a longitudinal study of company-grade officers who serve in ADAM cells. The Command and General Staff College curriculum also limits time for the author to conduct onsite assessment of ADA training programs or ADAM cell officer evaluations. Either type of study would provide more validity to the study's hypothesis.

Leader development is a broad subject area and consists of a large collection of actions that contribute to the overall result. The scope of this study does not include the self-development domain of leader development. The effects of this domain toward leader development are great and should not be underestimated.

Security is a major concern for this study. Many of the training requirements involve secret classification. Therefore, only an unclassified review of ADAM cell operations and technical specifications will be discussed.

### Delimitations

This study will focus exclusively on four aspects. They are the ADAM cell captains, the leader development elements within the operational and institutional domain, the actual actions and experience of officers operating in ADAM cells, and the doctrinal purpose of an ADAM cell OIC. As a result, the recommendations for any changes will be made from the perspective of the ADAM cell and not from other ADA branch assets such as Patriot or terminal high altitude area defense.

## Conclusion

This study explores the ADAM cell, the ADA company-grade officer in the ADAM cell, the training they receive, and experience in execution. It will assess the importance of the ADAM cell and the potential future role of captains within the organization. This study will identify the gaps in the professional development of ADA officers in preparation to serve as an ADAM cell OIC in the current environment.

The literature review will focus on the following areas: a review of reports concerning company-grade officers in ADAM cells; the recent history (2003-2010) of research conducted on the training, education, and experiences company-grade officers receive prior to assignment to an ADAM cell; a review of the doctrine; and the organization and purpose of the ADAM cell. Chapter 3 will describe how the study uses an adaptation of the Army design methodology to analyze the literature reviewed in chapter 2. Chapter 4 will identify four friction points that impede the progress toward the Army's desired end state as defined by the purpose of the ADAM cell OIC. The final chapter will provide conclusions and recommendations for future research in the study of junior officer leader development within the ADA branch.

## CHAPTER 2

### LITERATURE REVIEW

#### A Brief History of the ADAM Cell

##### ADAM Cell Origins

In 2003, the Army began to shift away from a division-centric organization where division commanders would allocate specific assets to commands by creating task forces. Instead, the Army adopted the modular brigade and divided the warfighting functions that would normally reside as division assets. So, rather than task-organized units from numerous separate battalions, one BCT would have those same capabilities organic to their formation.

As a result, the separate battalions were inactivated and their functions were either subsumed into a BCT, placed under a functional brigade, or transitioned to the reserve component. Several factors determined the course of action for SHORAD battalions after their inactivation. First, the continued dominance of the air domain by the Air Force nullified the applicable use of SHORAD. By 2001, no nation state could rival American air power (Congressional Budget Office 2005). Second, the need for the increased number of maneuver personnel in the BCTs was a significant factor for the inactivation of so many units. The SHORAD assets would not disappear completely from the Army however. Two SHORAD battalions remained active and six Patriot-pure battalions would incorporate one Avenger battery creating composite air and missile defense (AMD) battalions. These AMD battalions would provide a layered defense with multiple engagement opportunities against cruise missile defense, unmanned aerial vehicles (UAVs), air breathing threats, and tactical ballistic missiles. These pooled systems would

be available to deploy and support any future expeditionary action in a mission tailored fashion (Army Modernization Plan 2008). The remainder of SHORAD units reside in the reserve component. In the reserves, the capability to defeat lower altitude air threats can be maintained and called upon more rapidly than eliminating the capability altogether. The development of the ADAM cell was a tradeoff for the inactivation of numerous SHORAD battalions and is the lone remnant of air defense capability in BCTs (Costello 2009).

In 2003, the cell was manned with one captain (14A, ADA officer), one warrant officer (140A, Command and Control Systems Technician), and three enlisted personnel (14G, Air Defense Battle Management System Operator) (Mace 2003). The cell was linked to the brigade aviation element (BAE) to focus all the airspace management efforts for the BCT. The BAE consisted of a nearly parallel structure with a major and a captain (15A, Aviation officer), one warrant officer (150A, (Air Traffic Control Tactician), and two enlisted personnel. By 2005, the ADAM cell structure was amended to include another major (14A, ADA officer) (Fitch 2006).

The early structure of the ADAM cell was often very fluid. Lieutenants rather than captains often manned initial organizations. This was not unusual, as the brigade would have had a strong habitual relationship with the former Avenger battery executive officers (Mace 2003; Fitch 2006; Corby 2008).

Assignments were also complicating structure and composition as the Army implemented the Army force generation cycle. Early during implementation, BCTs would receive their ADAM cell officers as they were deploying to Operation Iraqi Freedom or Operation Enduring Freedom. This did not often allow units to train with

their new personnel and provided a short window for which new officers would be given the opportunity conduct deliberate training in their new assignment. Even if units received their personnel, they often would not be fielded with the equipment they needed (Rush 2006; Engelbrecht 2010).

### Current ADAM Cell Doctrine

The study will now review the current Army doctrine that discusses the responsibilities of the ADAM cell and by extension the ADAM cell OIC. Army Techniques Publication (ATP) 3-01.50, Air Defense and Airspace Management (ADAM) Cell Operation, is the doctrinal publication that exclusively applies to the ADAM cell. The current version, dated April 2013, is an update from an interim field manual of the same number published in February 2007.

The current publication provides the mission, task, and purpose for the ADAM cell, its team members, and related organizations such as the BAE. According to ATP 3-01.50, the ADAM cell shares mission responsibilities with the BAE. The two are essentially synonymous with one another. In order to understand how one works, the full mission of the combined cells must be identified.

The ADAM/BAE Cell plan, coordinate, and establish connectivity for unified actions with communications systems, command and control (C2) and intelligence /controller networks, as well as airspace users; provides situational awareness and early warning; conducts continuous planning and execution of airspace management requirements for the supported unit/echelon; and conducts AMD and Aviation planning and coordination to determine AMD and Aviation requirements across the spectrum of conflict. (Air Defense and Airspace Management (ADAM) Cell Operations 2013)

This shared mission is divided into four separate but mutually supporting tasks. The first task is to plan, coordinate, and establish connectivity into the communications

systems, command and control and intelligence (C3I) controller networks. In order to accomplish this task, the ADAM/BAE cell must utilize the available compilation of hardware. They include the air and missile defense workstation, forward area air defense (FAAD) workstation, and air defense system integrator (ADSI) workstation. Each of these workstations includes a suite of radios and antennae to provide external connectivity. As a whole the equipment is transported across the battlefield in a standardized integrated, command post system rigid wall shelter mounted on a high-mobility, multipurpose-wheeled vehicle.

The Sentinel radar is another essential piece of the communication system that provides a local air picture. While the shared operating picture provided by air defense coordinators above brigade can provide a wide-angle view of the airspace above the BCT, the Sentinel radar provides the most critical capability of providing detail to the items in the BCT airspace. The doctrine explicitly states, “the Sentinel is essential for unmanned aircraft system (UAS) identification” (Department of the Army 2013a). Those networks link BCTs to the airborne warning and control system, Aegis combat systems, the joint surveillance target attack radar system, and the control and reporting center (Department of the Army 2013a).

All of the previously mentioned communication systems must then be connected to mission command and intelligence/controller networks and airspace users. Together these networks provide the information needed to accomplish other mission tasks.

The second task is to “provide situational awareness and early warning” (Department of the Army 2013a). This is accomplished through the proper integration of the communication systems into the mission command and intelligence/controller

networks with other airspace users. The ADAM/BAE cell is able to provide a full accounting of all airspace users within, and potentially adjacent to, the BCT's airspace. The ADAM/BAE cells call this capability "reach" since it allows the commander and his staff to pull information and data that would not ordinarily be available to the BCT. The reach extends beyond the division and could even reach strategic assets. In the event of enemy air attack, the BAE is capable of receiving warning and disseminating that to all subordinate units within the BCT (Department of the Army 2013a).

The third task is to "conduct continuous planning and execution of airspace management requirements for the supported unit/echelon" (Department of the Army 2013a). Simply stated, this task requires the ADAM cell be active in the execution of all BCT operations. The ADAM/BAE cell is required to deconflict everything that traverses the airspace above the BCT. This role is extremely important in the mitigation of fratricide in the BCT but it causes friction in the ADAM/BAE relationship.

The fourth and final task in the ADAM/BAE mission is to conduct air and missile defense (AMD), aviation planning, and assess requirements needed to accomplish the BCTs mission (Department of the Army 2013a). Since the three basic BCTs do not contain organic AMD or aviation assets, this task provides the link for those assets when they are assigned or attached for operations. In addition, the ADAM cell provides an essential link to the area air defense commander, and the AAMDC. Situational awareness is passed back and forth between the BCT and these air defense coordinators above brigade. The information provided to the AAMDC and area air defense commander assist in the synchronization and integration of joint theater air operations.

As stated before, the ADAM cell this study addresses resides in the BCT. ADAM cells can be found on corps and division staffs as well. Most of the equipment does not change, but the roles and responsibilities are adjusted slightly as assets and scope of responsibility at each of those echelons change. The same basic mission applies to each of them as well.

The ADAM/BAE cell is not found in every brigade-sized element. The ADAM/BAE cell is found in the Infantry BCT (IBCT) and Armored BCT (HBCT). In the Stryker BCT (SBCT), there is no aviation augmentation and the ADAM cell stands alone. Support brigades, such as fires, aviation, and battlefield surveillance brigades, also have ADAM cells to aid in their integration with the maneuver force. Sustainment or combat support brigades and maneuver enhancement brigades do not have ADAM cells.

As of 2013, the doctrinal organization of the ADAM cell in Armored and Infantry BCTs would consist of an ADA major to serve as the AMD coordination officer, also known as the ADAM cell OIC. The AMD coordination officer would have an assistant ADA captain to serve as the AMD plans officer and an AMD warrant officer (140A) to serve as the mission command systems integrator. The staff is rounded out with three 14G AMD NCOs (the change from 14J occurred after the publication of the ADAM cell operations manual). The BAE element has a nearly identical structure with the addition of an Unmanned Aircraft Systems Warrant Officer (150U).

The ADAM cell composition in the SBCT, fires, aviation, and battlefield surveillance brigades eliminated the ADA major. Instead, according to the ADAM cell operations manual, those organizations have an ADA captain as the AMD coordination

officer or ADAM cell OIC. They also reduced the 140A requirement down to a chief warrant officer 2 and eliminated one NCO (Department of the Army 2013a).

A review of the roles assigned to each ADAM cell officer shows that the AMD plans officer only has one role in an IBCT or ABCT. The manual states the “AMD plans officer – Assists the Chief, AMD Plans, and assumes his duties and responsibilities in his absence” (Department of the Army 2013a). Those responsibilities now belong to the ADA captain because the current modified table of equipment does not list an ADA major in the position of AMD coordinator.

The roles and responsibilities of the AMD coordination officer are not very different from the responsibilities of any other staff officer. Their primary responsibility is to serve as a coordinator between their assigned unit and higher headquarters regarding all airspace command and control.

Because the AMD coordination officer is the only ADA officer within the BCT, they provide special area expertise to the commander by default. As the subject matter expert, they will develop the air defense plans, task organization for any assigned air defense assets, and develop the scheme of air defense operation within the BCT. In addition to developing air defense specific plans, they are also responsible for planning reconnaissance and surveillance operations, presumably in coordination with the intelligence staff and the Air Force liaison officer.

Because the BCT does not have any organic AMD assets, the AMD coordination officer can only serve as the liaison for any augmented AMD assets that the BCT receives. The AMD coordinator is also responsible for planning and preparing airspace

command and control of UAS operations, tactical employment of aviation assets, and positioning forward arming and refueling points.

The role of the AMD warrant officer serves as the mission command systems integrator. Their responsibilities require the greatest level of technical knowledge because of the numerous communication links and the dynamic configurations required to establish and maintain a stable network architecture twenty-four hours a day. This is a key point and will be discussed later in chapter 4.

In summation, the tasks that the ADAM cell officers are responsible for completing are predominantly related to operations and military decisionmaking processes. Each of the officers shares in the responsibility to provide input into the processes. The mission command systems integrator has substantial technical requirements that take precedence over coordination and advising.

Training Circular 1-400, Brigade Aviation Element Handbook, is worth noting. It provides a plethora of information on Army aviation assets, as well as planning factors and tools to assist with managing the airspace in within the BCT. The handbook does not provide any guidance, however, on how to manage the ADAM cell personnel or equipment. Currently, there is no training circular published with similar information for ADAM cell officers to use when assigned as ADAM cell officers (Department of the Army 2006).

#### ADAM Cell Training in ADCCC and the ADAM Cell Course

The study will now address the secondary question concerning how company-grade ADA officers are trained and prepared to assume the role of ADAM cell OIC. The institutional domain is the primary means used to prepare officers for this role. There are

two opportunities for ADA captains to train on ADAM cell OIC operations. This starts with a review of what is taught at the Air Defense Captains Career Course (ADCCC) in reference to the ADAM cell functions listed above. Second, the study will review the learning objectives for the ADAM cell course.

The ADCCC is the academic course that prepares company grade officers for “future AMD assignments” (Air Defense School 2013). The ADCCC is ideally positioned between the fourth and sixth year of service for ADA officers (Department of the Army 2010). In that position, the course stands as the last mandatory academic assignment before ADA captains are assigned to ADAM cells. However, the numerous assignments where graduating captains can be assigned after ADCCC prevents the course from focusing entirely on subject areas related to the ADAM cell OIC. As such, the course divides instruction into five subject areas. Table 1 shows the training module titles, the total number of hours per module, and the respective lessons and that relate to ADAM cell operations. They are: common core, Air and Missile Defense, Joint AMD Operations, AMD planning, and Leadership.

Table 1. Air Defense Captains Career Course Module Lessons pertaining to ADAM Cell operations

Module / Title	Lessons	Hours
A / Common Core	<ul style="list-style-type: none"> <li>• The military decision making process</li> <li>• Fundamentals of the operations process</li> <li>• Doctrinal foundations [Unified Land Operations]</li> </ul>	320.0
B / Air and Missile Defense (AMD)	<ul style="list-style-type: none"> <li>• Sentinel Capabilities and Limitations</li> <li>• Avenger/Stinger Capabilities and Limitations</li> <li>• C-RAM Capabilities and Limitations</li> <li>• Joint Theater Air Operations (JTAO)</li> <li>• Air and Missile Defense Design</li> <li>• Air Defense Airspace Management (ADAM) Cell</li> </ul>	58.5
C / Joint AMD Operations	<ul style="list-style-type: none"> <li>• Theater Air Control System (TACS) and the Army Air-Ground System (AAGS)</li> <li>• USAF Overview and AMD Integration</li> <li>• Joint Air Tasking (ATO) Cycle</li> <li>• ATO/ACO Development</li> <li>• Fratricide Avoidance</li> <li>• Joint Airspace Control</li> </ul>	29.5
D /AMD Planning	<ul style="list-style-type: none"> <li>• AMD Considerations in IPB and MDMP</li> <li>• AMD Orders and Annexes</li> </ul>	264.0
E / Leadership	<ul style="list-style-type: none"> <li>• (No courses pertain to the ADAM Cell)</li> </ul>	49.0

Source: Created by author.

The common core curriculum is mandated for all branches and focuses on “mission command, the operations process, training, unified land operations, culture, critical thinking, and enabling leadership competencies, and leadership applied to company-sized organizations.” These lessons are intended to prepare the student to “lead company-sized teams and function on battalion or brigade staff officer in the Contemporary Operational Environment” (Air Defense Captains Career Course program of instruction 2014). This module comprises 320 hours of the 721 total academic hours of the ADCCC equaling about 44 percent of the entire course. The curriculum provided in this training module should prepare ADA captains to serve in primary staff positions for

most any battalion and brigade formation because the instruction is neutral to organization function.

The Air and Missile Defense module contains the instruction on the ADAM cell and its functions. However, because this module is designed to create an understanding of all AMD organizations and systems the amount of time available for dedication to ADAM cell roles and responsibilities is limited. When compared to the core curriculum, this module only comprises 8 percent of the course or 58 hours. Despite the relatively short amount of time, the students are still expected to become “AMD tactical experts” (Air Defense School 2013).

The Joint AMD Operations module is the shortest of all five modules at 29.5 hours of study or 4 percent of the course. In this module, students are familiarized with “joint air command and control, targeting process, offensive and defensive counter air, joint/multinational airspace management and C4I” (Air Defense School 2013). Many of these topics are similar to those of the joint firepower course.

The AMD planning module is a robust 264 hours of instruction and practical exercise. The purpose is to develop the students’ intelligence preparation of the battlefield (IPB) process “at the battery level” (Air Defense School 2013) with considerations of battalion and brigade level operations. This module focuses on the major systems employed by AMD units and does not cover the ADAM cell.

The final module, Leadership, quite simply prepares officers to lead teams and demonstrate character and competence. The 49 hours of instruction comprises nearly 7 percent of the course, nearly twice that of the Joint AMD Operations module. This is a

logical necessity in a course designed to prepare company grade officers to lead the larger formations in environments that are more difficult than what they have experienced.

Focus will now shift onto the ADAM/BAE Ground Integration Course. This course provides instruction to the combined cell due to the interdependent nature of the cells. A memorandum of agreement stipulating the responsibilities for the course identifies the United States Army Air Defense Artillery School as the entity who will conduct the course. The lesson material is a shared responsibility between the Air Defense School and the United States Army Aviation Center of Excellence. “Each school will exercise collaborative control over course requirements for the subjects and tasks within their designated propensity” (United States Army Fires Center of Excellence 2011). The ADAM/BAE Ground Integration Course replaced three other courses: the ADA Airspace Coordination Digital Training Course, its mobile training team version, and the Brigade Aviation Element Course.

The course is not specific to one member of the ADAM/BAE, rather it is designed so that all students participate in a capstone event where the combined cell conducts critical tasks and drills using vignettes to apply the material learned throughout the course. The course is divided into four modules over 136 instructional hours.

Module A covers ADAM/BAE roles and responsibilities, doctrine, and basic tactics. During this module, the entire class (students from specialist through major) receives a basic overview of aviation and AMD operations, airspace control measures, and sense and warn operations. This series of instruction builds upon the basic understandings in several common areas such as airspace control measures. However, it may be the first time many of the students receive training on AMD or aviation

operations. This would imply the depth of study is very shallow and the desire is to familiarize rather than establish expertise in those areas.

Modules B and C are taught concurrently. The airspace planners are separated from the system operators and provided with unique instruction. Module B is for the planners (the ADAM cell OIC, ADAM cell planner, brigade aviation officer (BAO), and brigade aviation planner). During this specialized training, the students are educated in fourteen separate topics. The list can be found in Table 2.

Table 2. ADAM/BAE Air Ground Integration Course Modules, lessons and attendees.

Module	Topics	Attendees
A	<ul style="list-style-type: none"> <li>• ADAM Cell Course Orientation</li> <li>• Introduction to ADAM/BAE</li> <li>• Aviation Operations</li> <li>• Sense and Warn</li> <li>• AMD Operations</li> <li>• Airspace Control Measures</li> </ul>	All
B	<ul style="list-style-type: none"> <li>• Aviation Reconnaissance and Security Operations</li> <li>• Assault Helicopter Operations</li> <li>• Air Assault Planning</li> <li>• AMCM<sup>a</sup>/AMB<sup>b</sup></li> <li>• JAAT<sup>c</sup></li> <li>• Aero-Medical Support/Evacuation</li> <li>• Joint Doctrine and Operations</li> <li>• TACS/AAGS</li> <li>• Joint Doctrine and Operations</li> <li>• JAOC<sup>d</sup>/BCD<sup>e</sup></li> <li>• MTACS<sup>f</sup>/MACCS<sup>g</sup>/SOAGS<sup>h</sup></li> <li>• CRC<sup>i</sup>/TAOC<sup>j</sup></li> <li>• Joint Air Support Requests</li> <li>• AMD Planning</li> <li>• Joint Fires Support</li> </ul>	ADAM/BAE Cell Planners
C	<ul style="list-style-type: none"> <li>• ADSI Overview w/ TacView</li> <li>• FAAD/C-Ram C2<sup>k</sup> Overview</li> <li>• FAAD/ADSI Integration</li> <li>• AMDWS/FAAD/ADSI Integration</li> <li>• TAIS Overview</li> <li>• TAIS/ADSI/AFATDS<sup>i</sup> Integration</li> <li>• AC2 Interoperability</li> <li>• Systems Integration</li> </ul>	ADAM/BAE Cell Operators
D	<ul style="list-style-type: none"> <li>• ADAM/BAE Critical Tasks</li> <li>• Airspace Control Collective Tasks</li> <li>• Capstone Final Practical</li> <li>• TAIS Overview</li> <li>• AC2 Interoperability</li> <li>• System Integration</li> </ul>	All

<sup>a</sup> air mission coordination meeting

<sup>b</sup> air mission brief

<sup>c</sup> joint air attack team

<sup>d</sup> joint operational access concept

<sup>e</sup> battlefield coordination detachment

<sup>f</sup> marine tactical air command squadron

<sup>g</sup> marine air command and control system

<sup>h</sup> special operations air-ground system

<sup>i</sup> control and reporting center

<sup>j</sup> tactical air operations center

<sup>k</sup> command and control

Source: Created by author.

The extensive list of topics attempts to be all encompassing for potential operations the BCT may encounter. Again, the subject matter is broad and all encompassing, so there is expectation that the course offers only familiarization with an opportunity to socialize lessons learned and best practices amongst the students and faculty.

As stated before, module C is conducted concurrently with Module B. It focuses on the operators of the C4I systems found in the ADAM/BAE. Both groups reunite in Module D where they undergo a capstone practical exercise incorporating the training they received throughout the course. Ultimately, the course provides familiarization training that is very specific to the function of the ADAM cell yet does not provide certification for many of the topics covered.

#### Review of Journal Articles

Professional military journal articles define a distinctive pattern over the course of the ten-year history of the ADAM cell. Initial articles provided blurbs about what the ADAM cell is and how it leads change in the Army. Many of these types of articles only used the ADAM cell as a distant point on the horizon of the future for air defense operations (Jassey 2004).

During 2004 to 2005, articles by the first ADAM cell officers were being published. Those articles gave an in-depth look at what assets the ADAM cell actually had as well some basic functions. The intent for these articles was to familiarize laymen to the equipment and benefits of the ADAM cell (Mace 2003).

From these articles it can be assessed that leaders in the BCTs were not utilizing the full potential of the ADAM cell primarily due to a lack of understanding and awareness, despite the widespread messaging in 2003 and 2004 (Corby 2008).

In order to understand the practical application of the ADAM cell, the study will review published papers and articles covering the ADAM cell. Only six professional articles published since 2003 have dealt directly with the ADAM cell. Individually, each provides a unique perspective on what makes a functioning ADAM cell. Taken altogether, the articles identify the evolution of poor performance trends as seen by training center OCs and experienced ADAM cell OICs.

Starting in 2003, Captain Scott Mace, then an ADAM cell OIC, discussed his experience in what he identified as the first ADAM cell in a SBCT. The article provided an immense amount of detail about the equipment found in an ADAM cell and the personnel manning the systems. The article also discussed their successful integration with a National Guard Patriot unit and a brief description of some possible capabilities doing so provided the BCT. There was no mention of how it was actually used in a deployed setting or of problems with integration within the BCT (Mace 2003).

Three articles were published in 2006. In January, Captain Wayne Rush, then an ADAM cell plans officer for an IBCT, discussed his experience in an undermanned cell during a mission readiness exercise. He provided some keen insights into what would be continued problems of integration in the years to come. In particular, Captain Rush identified the need to cross train individuals in the ADAM/BAE cell in order to ensure continuity and 24-hour operations. Second, he noted the importance of airspace management at the BCT level. In hindsight, this article is ripe with implied tasks and

requirements for captains preparing for assignments to ADAM cells. Considering the amount of time Captain Rush discusses the cell's interaction with fires, intelligence, Army aviation, and Air Force assets, it should be noted that his ability to understand how each of these elements worked and integrated into the BCT's fight was of utmost importance (Rush 2006).

The next article published in 2006 came from Lieutenant Colonel Michaelson, the senior ADA ADAM cell observer-controller at the National Training Center. The article focused on four key areas to ensure success as an ADAM cell OIC. First was the layout of the current operations portion of the ADAM cell. Second was the basic skill of understanding airspace command and control measures. Third, he stressed the need for an additional working group or rehearsal of concept drill to ensure airspace control measures are understood and deconflicted prior to an operation. Finally, his biggest point was being an active member of the BCT staff (Michaelson 2006). At this time in 2006, ADAM cells were being fielded with both captains and majors. Even Captain Rush had an ADA major despite the shortage of personnel in the ADAM cell.

The final article published in 2006 came from Chief Warrant Officer 1 Fitch, the ADAM cell systems integrator and OIC. The majority of the article discusses the integration of the ADAM cell with the aviation and fires elements along with practical tactical and technical procedures. He summarizes the article emphasizing the need for leaders capable of learning the methods and tasks of other branches (Fitch 2006).

In 2008, Captain Corby rehashed many of the same issues Lieutenant Colonel Michaelson discussed in his article. Corby's stance was harsher as he presented most of the ADAM cells in the Army as do nothing cells that allowed the capability to wither.

What were needed were ADAM cell personnel knowledgeable in unified land operations, air ground integration, air force, and Army aviation. In addition, Corby reiterated the need for persuasive and driven “campaign managers” (Corby 2008).

The latest article, written in 2010 by Captain Engelbrecht, not much has changed over the four previous years. As an observer-trainer at MCTP, Captain Engelbrecht had the opportunity to see first-hand the performance of many ADAM cells. The article lays out a succinct list of changes that needed to take place if the ADA branch was going to ensure the success of future ADAM cells. He used the doctrine, organization, training, materiel, leadership and education, personnel, and facilities framework to identify shortfalls and provide recommendations (Engelbrecht 2010). He recommended updating the interim doctrine that had been the only publication in use since 2007. The manual was updated in the year following the article’s publication, removing much of the technical focus. Captain Engelbrecht recommended the rank structure become less parallel and more hierarchical to alleviate competition and “enhance cohesion” (Engelbrecht 2010). His training recommendations were extensive. Problems he identified included issues with attendance and availability of classes. As a solution, Engelbrecht recommended more combined and joint training, mandating attendance at the Air Ground Integration Course, and differentiating leader from operator skills in the ADAM Cell Course. Many of the changes he recommended have been adopted but issues with the ADAM Cell Course remain, a topic addressed later in chapter 4. Engelbrecht did not have any recommendations of importance with regards to materiel. His leadership and education recommendations attempted to convince ADA officers that becoming an ADAM cell OIC was not detrimental to the longevity of their career. Nevertheless, he does note the

importance of managing assignments and integrating familiarization of assets into the ADCCC. Engelbrecht again emphasized the need to manage personnel being assigned to ADAM cells in a manner that allows them time to attend the ADAM Cell Course and train with their unit. According to the article, ADAM cell OICs did not have the time to do either. Finally, Engelbrecht's facilities assessment recommends establishing infrastructure to support a joint ADAM/BAE cell course to integrate with joint agencies more regularly (Engelbrecht 2010). This has also been established as discussed in the previous section.

#### BAE Doctrine

A short review of BAE doctrine and published articles is required because of the close relationship the two cells share at the BCT. The majority of the articles surrounding the BAE focus primarily on air ground integration concerns. However, airspace management receives ample discussion.

Many of the BAE articles discussed some of the same issues that the previous ADAM cell articles raised. One article in particular, written by Major Erick Sweet, discusses three critical tasks that BAE OICs must accomplish if they expect to be successful. The first is air-ground integration; the second is being decisively involved with UAV operations within the BDE; and the third is managing airspace. According to his article, the best organization for this job is the ADAM cell. The assets and capabilities they employ are invaluable and reach far beyond the capability of the tactical airspace integration system the BAE uses. In the article, MAJ Sweet identifies the importance of integrating the ADAM cell capabilities and not allowing the two cells to operate independently of one another (Sweet 2010).

## Operational Experiences

While journal articles do provide a professional view of a particular topic, personal accounts can shed light in areas not readily discussed in professional forums. This study uses interviews discussing operational experiences to fully understand the dynamics of the ADAM/BAE cell.

In 2009, Major Eric Sweet provided his thoughts on implementing the ADAM cell in a combat situation. His view was that the structure of the organization was faulty because the ADAM/BAE cell was comprised of two majors, one ADA and the other Aviation. In his situation, each of the majors fought for dominance and control over their own personnel and it hindered the overall synergy that the cell was supposed to provide. Major Sweet also noted that the most valuable aspect of the ADAM cell was the warrant officer and the system that he operated. Once that ADAM/BAE cell was rid of the competing interests and fully incorporated the information that the ADAM cell equipment provided, they were much more effective. During his time leading the ADAM/BAE cell, they worked closely with the fires and effects coordination cell, Army UAVs, and the Air Force close air support. At one point he had seven different airspace users: the Marines, Army aviation, theater assets, UAVs, tube artillery, multiple launch rocket systems, and mortars. With all of those assets traversing the airspace, the ADAM cell provided the greatest effect in managing all of those assets. Sweet saw the importance of the ADAM cell when employed properly (Sweet 2009).

While Major Sweet saw the benefit of utilizing the ADAM cell in Iraq, Major George Corbari saw the effects of commanders who had no use for ADAM cells or their equipment in Afghanistan. Upon arrival, Major Corbari was assigned as a brigade

planner. His commander allowed him to work ADAM cell issues in his down time, but his priority was planning. The issues Major Corbari saw were the lack of Sentinel radars making his organic equipment useless to his BCT commander. After his operational needs statement for getting radars was successful, he was able to manage the airspace. The difference in theaters was substantial. The Iraq theater had a more robust sensor system and could provide detailed data about aircraft identified by numerous sensors to BCTs and higher headquarters. However, the Afghan theater lacked the resources that Iraq had at the time (Corbari 2009). “The boss that replaced him, the unit that replaced us, said, “Yeah, we don't care about that at all.” They did not man it; they did not run it and within 30 days of taking over for us had an incident where they hit and damaged an aircraft with an artillery round. That's what happens when you don't do what you're supposed to be doing” (Corbari 2009).

#### CALL and Training Center observations

Meanwhile, observer-controllers at both the Joint Readiness Training Center and the National Training Center identified deficiencies in the officers assigned as the ADAM cell OICs. The observer-controllers indicated that many of the assigned officers lacked the skills necessary to accomplish their tasks (Dohogn 2013; Engelbrecht 2010; Futscher 2013a), let alone advise their commanders of the potential role the ADAM cell can play.

Captain Engelbrecht, a MCTP observer-controller in 2010, recommended several courses of action to resolve the poor development of company-grade ADA officers serving as ADAM cell planners and OICs. Increasing the amount of institutional training the officers receive prior to assignment to an ADAM cell was paramount. He also

recommended an assessment of how the ADA branch grows and prepares officers for ADAM cell missions and functions (Engelbrecht 2010).

The majority of the recommendations revolved around two issues. First, the ADA branch had to increase the available seats in the ADAM/BAE Course and send officers prior to assignments as ADAM cell officers (Engelbrecht 2010; Futscher 2013a). Second, prospective ADAM cell officers needed to prepare themselves. They needed to be persuasive in describing the benefits the ADAM cell provided the combatant commander. The implied task was that the ADA officers needed to understand the framework in which the maneuver command fights and wins.

The Center for Army Lessons Learned posted an article detailing the current concerns of the ADAM cell as the Army transitions from war. MAJ Andrew J. Futscher's article on airspace planning assessed that ADAM cells have become accustomed to operating in a counterinsurgency environment where most actions are predictable. Rather than relying on predictable operations, ADAM cells need to be more prepared to plan in a rapidly changing environment by synchronizing multiple airspace users both simultaneously and sequentially. Futscher would prefer ADAM/BAE cells plan dynamically for near-real-time control of airspace users. Apparently, ADAM cell planners were not adjusting plans as the battle progressed.

He identified seven concepts that aid in ADAM/BAE planning. They are shared responsibility for planning among all airspace users, understanding the commander's priorities for airspace, simplicity in the planning of airspace control measures, flexibility, maximum use of procedural controls, minimum number of airspace control measures

recognizable from air and ground, and all airspace controls are developed by troops in contact.

Futscher emphasized that in order for the plan to work, all airspace users must be synchronized in accordance with the commander's intent. He provides practical techniques on how the planning principles could be implemented but reiterates every situation is different and requires tailored plans. Futscher presumed a lack of training and the current operating environment are the primary causes for lack of dynamic planning (Dohogn 2013; Futscher 2013b).

## CHAPTER 3

### RESEARCH METHODOLOGY

#### Overview

This study attempts to answer the primary research question “Does the ADA branch prepare ADA captains to manage the airspace domain within the BCT with the current organization construct and lack of new systems given the training, operational, and institutional constraints?” using qualitative analysis of the literature reviewed in chapter 2. Any secondary questions not answered in the literature review will also undergo qualitative analysis in chapter 4. The hypothesis this research attempts to prove is the ADA branch is not properly preparing company-grade officers to operate and integrate in BCTs.

This study will use a qualitative analysis of numerous subject areas in order to arrive at a conclusion and recommendation. The complexity of the problem requires a clear framework for which the problem can be identified and an appropriate solution identified that addresses the issues. For this reason the study will adapt the Army design methodology as a framework for discussing and analyzing the material under review. The study identified the following categories for consideration: historical and current doctrine, current ADAM cell training programs, Army training center assessments of ADAM cell OICs, the Army Leader Development Strategy; the Army’s view of potential operating environments that affect the current doctrinal function of the ADAM cell, and professional writings on the ADAM cell to conduct a qualitative analysis.

### Research Criteria

The study focuses on the function of the ADAM cell OIC, what are they required to be able to do, and how are they trained to do it. The lack of scholarly material specifically on this subject required research in many other areas that relate to the problem.

All ADAM cell doctrine from 2003 to present was reviewed. The year 2003 was chosen because the cell did not exist prior to that time. The review focused on the missions, roles, and responsibilities of the OIC. Additionally, BCT doctrine from 2003 to present was also chosen because the ADAM cell resides within a BCT. This enables a comparative analysis of the changes to the roles and responsibilities over time and across doctrinal manuals.

In order to extend the understanding of how the ADA branch prepares ADA officers for ADAM cell positions, a review of both the ADAM cell training program and the ADCCC training was conducted. Unlike the ADAM Cell Course however, the ADCCC prepares officers for a broader range of assignments upon completion. Because of the broad scope the ADCCC must cover, the study concentrated on the portion of the ADCCC training that discussed BCT, division, and airspace management operations.

A review of published and unclassified training assessments was conducted to identify the shortfalls that many of the professional articles discussed. Only the results from the previous six years were analyzed. This assessment is to validate a prior assumption that ADAM cell OICs at the BCT level do not perform well. Additionally, this study limited assessments to the past six years because it should be expected that

with the implementation of a new mission and role, there will be ample learning and adjustments needing to be made early in its inception.

A review of doctrine was conducted to assess the missions and roles the ADAM cell and its OIC are required to execute to conduct operations. The review was further restricted to the current operating environment without regard to potential future threats beyond the year 2020.

Because the ADAM cell has only been in existence since 2003, there is a meager amount of professional writing regarding its organization, operation, and perceived problems. Therefore, this study will conduct a comprehensive review of published material regarding the ADAM cell employment. Because the ADAM cell is synonymous with the BAE, research was extended to include material discussing the function of the BAE as an airspace manager.

### Framework of Analysis

This qualitative study uses the Army's design methodology as a framework for understanding the relationships between the numerous variables that contribute to the problem for the ADAM cell OIC. The Army design methodology is intended for use by Army commanders and staff to solve operational and strategic problems with multiple variables that make simple cause-and-effect decisionmaking ineffective. The framework involves framing the operational environment, framing the problem, developing an operational approach, and developing the plan. This study will adapt the framework and stop at develop an operational approach by providing recommendations in chapter 5.

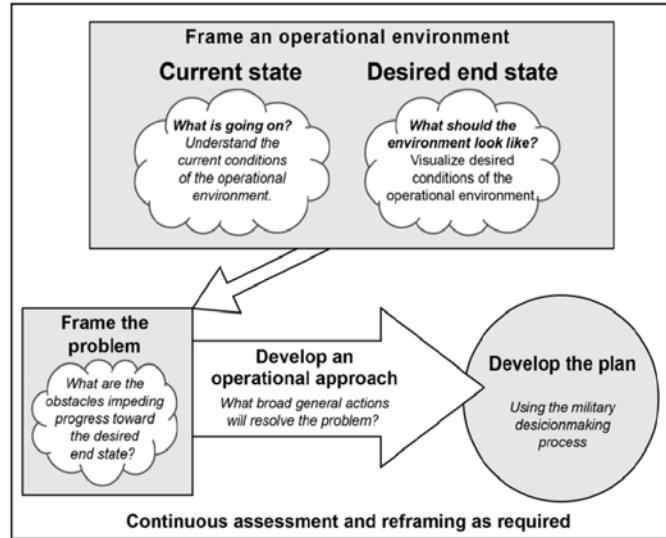


Figure 1. Army design methodology

*Source:* Department of the Army Headquarters, *The Operations Process* (Washington, DC: Department of the Army Headquarters, 17 May 2012), 2-16.

The first step of the methodology requires the researcher to frame the operational environment. The operational environment focuses on the current state and future or desired end state. This process provides the researcher a clearer understanding of the operational environment and removes perceptions and helps eliminate bias. It also serves to limit the scope of study to ensure the researcher does not become overwhelmed by unnecessary information.

The next step is framing the problem. In this step, the friction between the current state and desired end states are identified. The friction is the obstacle that prevents the current state from arriving at their desired state. This step is critical to the entire process and requires the greatest emphasis. Identifying the wrong problem will inevitably result in developing a solution that does not resolve the problem or worse, creates a greater problem.

The last step that this study will emphasize is the development of an operational approach. This process identifies “broad general actions to solve the problem” (Department of the Army 2012a). Often these general actions are categorized based on distinct efforts or functions of an organization. This study will divide the lines of effort between institutional, organizational, and individual; they are the officer development domains.

#### Strength, Weaknesses, and Bias

The strength of this study is the utilization of the Army design methodology for a framework of study. The design methodology is especially useful for qualitative analysis of situations. The process also assists in developing a clear understanding of both the environment and the problem. Over the course of the study, the researcher discovered the original research question to be a symptom of other problems.

This study’s weakness comes from the qualitative nature of the material. Sociological studies on leadership often do not equate statistics or mathematical algorithms that produce absolutes. Additionally, personalities within organizations differ and do not always lead to the same results, problems, issues, or successes. The study of military culture and group interaction is subjective and can be biased by the researcher.

The author’s own experiences and profession also presents the potential for a biased view. The author is an ADA officer who has served in an ADAM cell. The author’s experience is not unlike those addressed in the study. However, to eliminate this bias, the author makes every attempt to identify as many different points of view to provide input into this study. Therefore, this study expanded to identifying research material concerning airspace management to that of the aviation community as well.

Additionally, solutions and recommendations are not limited toward the creation or amplification of the role of the ADA branch. Solutions that reduce the prominence of the air defense community are also considered.

### Summary

The subject in this study will undergo a qualitative analysis utilizing an adaptation of the Army design methodology to arrive at conclusions and recommendations. This study will analyze the friction between the future operating environment and the current operating environment and develop recommendations to remove those obstacles. The use of this framework will amplify the validity of the study. Finally, bias exists in the point of view from which the study is written. Recommendations will not be developed based on a parochial view of one Army branch over another.

## CHAPTER 4

## ANALYSIS

### Introduction

As mentioned in the previous chapter, this paper is a qualitative analysis of how the ADA branch prepares ADA captains to serve as the ADAM cell OIC and manage a robust airspace domain in a low air threat environment. From that analysis, the author will recommend an approach for a solution to resolve any shortcomings. First, this chapter will frame the current threat and desired end state. That desired end state is comprised of the doctrinal requirements for the ADAM cell OIC. Second, the study will analyze the current state utilizing institutional and operational reports about training and performance and the current actions that address any shortfalls. Third, this chapter will frame the problem. In order to do this, the study has identified the friction points that hinder the development of the ADAM cell OIC. The recommendations for change will be published in chapter 5.

### Framing the Environment

Understanding the environment is essential in developing a plan that aims to correct or affect the current situation in order to reach a more beneficial condition. First, this chapter will use current doctrine to identify the desired end state for an ADAM cell OIC. There are two primary resource documents for this assessment. They are the Army techniques publication on ADAM cell operations and the Army field manual covering airspace control. Once the desired end state has been established, this chapter will then identify the current situation of the ADAM cell OIC. This current situation will be

established through a thorough review of recent trends noted by training centers O/Cs, as well as self-reporting from articles and first-person operational accounts.

#### Desired End State

The study will now establish the desired end state for the ADAM cell OIC as identified in the current doctrine for the Army on this subject. Unfortunately, the specific duties of an ADA officer as an ADAM cell OIC are unclear.

For example, ATP 3-01.50 does list all of responsibilities for the ADAM cell as those of the OIC but nothing for the BAO. Three issues make the lack of distinct BAO responsibilities confusing. First, no companion to the ADAM Cell operations manual exists for the BAE, aside from the training circular handbook. Second, in nearly every other manual, document, reference to the ADAM cell is synonymous with the BAE to the point the courses are combined at Fort Sill. Third, is that every task for the shared cell is listed as the responsibility of the ADAM Cell OIC. Because of the lack of a companion manual, the shared training course, and the synonymous use of both cells, ATP 3-01.50 should differentiate BAE and ADAM functions. Appropriately, Field Manual 3-52, Airspace Control, does apportion functions between the BAE and the ADAM cell. Conversely, it also identifies a middle ground of shared responsibilities between the two groups, not the individuals. The two manuals published in the same year should in a key area such as duties and responsibilities.

In order to resolve this issue, this study will need to analyze these differences. The first step is to recall the ADAM/BAE mission statement from the ADAM cell operations publication. The second step will be to conduct a cross walk of the ADAM/BAE mission statement to the doctrinal functions listed in the airspace control field manual. Finally,

this section will compare those functions with the duties and responsibilities from the ADAM cell operations publication. This cross walk will establish the required skills and capabilities needed by an ADA captain upon becoming an ADAM cell OIC.

This chapter will start with the first step and establish the mission of the ADAM cell and divide out the several roles of the ADAM/BAE cell. Here again is the mission of the ADAM cell:

The ADAM/BAE Cell plan, coordinate, and establish connectivity for unified actions with communications systems, command and control (C2) and intelligence /controller networks, as well as airspace users; provides situational awareness and early warning; conducts continuous planning and execution of airspace management requirements for the supported unit/echelon; and conducts AMD and Aviation planning and coordination to determine AMD and Aviation requirements across the spectrum of conflict. (Air Defense and Airspace Management (ADAM) Cell Operations 2013)

Recall from chapter 2, there are four distinct tasks that are interdependent upon one another. For reference, this paper will refer to them as C3I, Early Warning/Situational Awareness (EW/SA), Manage Airspace, and AMD/Aviation Planning. Together, they work to provide the BCT commander with the reach; enhanced situational understanding; and joint, interagency, intergovernmental, and multinational interoperability they require.

The paper will now turn its attention to the different functions listed in the airspace operations manual. As stated in chapter 2, the operation of the ADAM cell is synonymous with that of the BAE. This close relationship is established in both doctrinal publications. Some functions of the cell are shared between the BAE and the ADAM cell because of this very close relationship. The functions listed in table 3 correlate with the four tasks listed in the mission of the ADAM cell.

Table 3. Air Defense Airspace Management and Brigade Aviation Element Functions

ADAM	SHARED	BAE
<ul style="list-style-type: none"> <li>Plans and synchronizes air and missile defense operations with the concept of operations</li> <li>Produces the integrated air picture</li> <li>Plans low-level sensor employment</li> <li>Develops and maintains air defense artillery overlay to include unit locations, weapons control status, and weapon system coverage</li> </ul>	<ul style="list-style-type: none"> <li>Plans for airspace use and executes near real time control during execution and monitors operations of airspace users</li> <li>Analyzes airspace use to determine and resolve conflicts</li> <li>Reviews immediate airspace control means requests for conflicts with current operations</li> <li>Requests, maintains, and disseminates joint airspace coordinating measures</li> <li>Develops and coordinates airspace control appendix</li> </ul>	<ul style="list-style-type: none"> <li>Plans and synchronizes aviation with the concept of operations</li> <li>Advises and plans the use of unmanned aircraft systems, reconnaissance, attack, assault, air movement, sustainment, and medical evacuation</li> <li>Standardizes brigade combat team unmanned aircraft system employment</li> </ul>
ADAM air defense airspace management	BAE brigade aviation element	

Source: Headquarters, Department of the Army, *Field Manual 3-52, Airspace Control* (Washington, DC: Department of the Army, 2013), 2-10.

The paper will now conduct a crosswalk from the mission to the functions. This validates the functions listed in the field manual aligned with the mission of the ADAM cell operations manual.

Figure 2 depicts the relationships between the mission statement tasks and their correlating functions within the ADAM cell. The ability for a function to accomplish the tasks distinguishes the strength of the link.

ADAM/BAE Mission	ADAM Functions
C3I	Plans and synchronizes air and missile defense operations with the concept of Operations
EW/SA	Produces the integrated air picture
Manage Airspace	Plans low-level sensor employment
AMD/Aviation Planning	Develops and maintains air defense artillery overlay to include unit locations, weapons control status, and weapon system coverage

Figure 2. The cross-walk from ADAM/BAE mission to ADAM cell functions

*Source:* Created by author.

*Note:* Solid lines indicated which mission tasks are directly accomplished by the functions of the cell. Dashed lines indicate mission tasks that are supported by the execution of mission function but do not accomplish the mission task.

Starting with C3I, it is clear that the ADAM cell's function to produce an air picture is one of its contributions to the overall mission of the cell. The next task is providing early warning and situational awareness. Key to note at this point is that the task is to provide situational awareness and not understanding. Establishing low-level sensors, one of the two correlated task/functions for the ADAM cell, is a function that must be further supported if it is to provide the commander the understanding needed to make informed decisions. The other correlated task/function is to develop and maintain an air defense artillery overlay with unit locations. Skip "manage airspace" for the moment and review the AMD/AV planning task. Notice that every single function is lined up against this task, even if it is only partially connected through support. To be

clear, the ADAM cell functions are clearly aligned with AMD capabilities and strengths.

Finally, focus attention on “manage airspace”. It is the only task, within the entire mission statement, that does not have a strong link to the functions of the ADAM cell.

The lack of a strong link between managing airspace and any ADAM function can be assessed using that analysis. The ADAM cell functions take place in and utilize airspace, which does require management, but restricted to AMD capabilities and assets. For instance, planning and synchronizing AMD operations requires a management of active and passive air defense measures. This, however, is only one part of a much larger domain, thus requiring further synchronization with other airspace users such as the Air Force, field artillery fires, and intelligence UAV platforms. None of the functions mandate command and control of the air domain or other assets traversing the airspace.

This issue will be further addressed in the friction point section of this chapter.

That completes the review on ADAM cell functions. In summary, it is clear that the ADAM cell alone is fully responsible for ensuring integration of C3I systems into the joint network in order to provide situational awareness. Additionally, the ADAM cell is the single point of contact for the BCT when it comes to planning AMD and synchronizing the air defense plan in the theater of operations. The study will now analyze the shared functions of the ADAM/BAE. Figure 3 depicts the crosswalk from the ADAM/BAE mission to the shared functions of the ADAM and BAE. The shared functions listed imply that both the BAE and ADAM cell must work together to provide these functions.

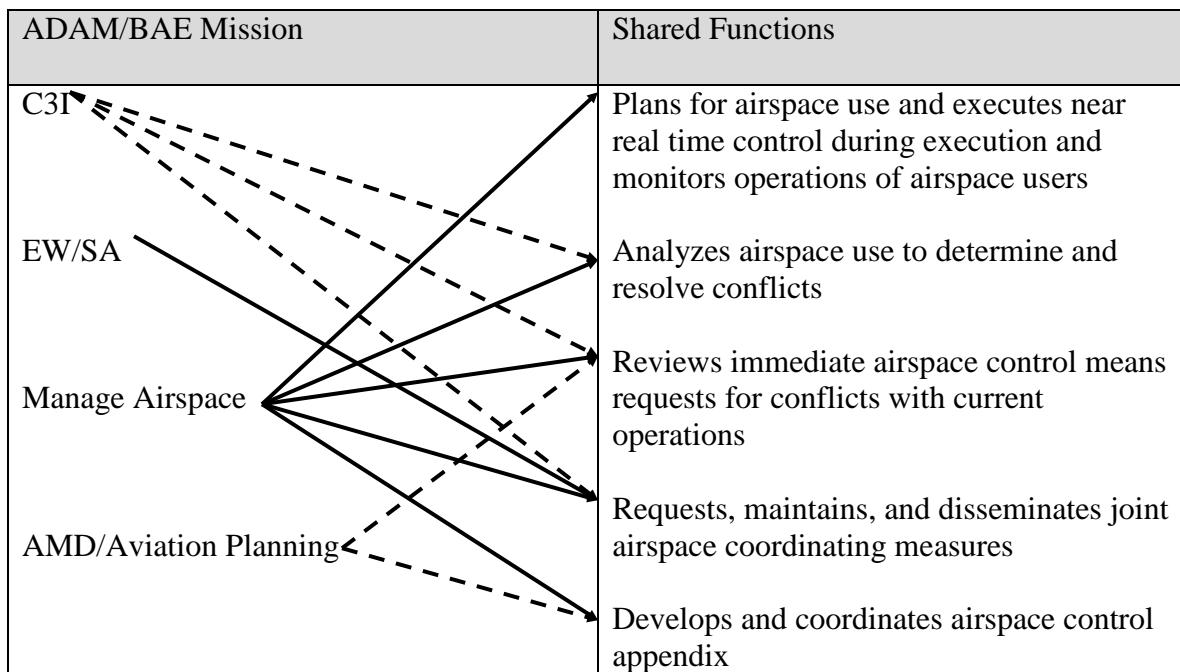


Figure 3. The cross-walk from ADAM/BAE mission to shared functions

*Source:* Created by author.

*Note:* Solid lines indicated which mission tasks are directly accomplished by the functions of the cell. Dashed lines indicate mission tasks that are supported by the execution of mission function but do not accomplish the mission task.

It is almost immediately obvious when comparing this figure with Figure 2 that the shared functions focus more on managing the airspace than any other function of the ADAM cell mission. Each shared function describes a cell that is fully knowledgeable about airspace user capabilities, exists below the coordination level for fixed wing aircraft, and understands how they affect the ground operations. The functions describe a staff that is more of a regulator rather than a cell that provides a specific capability. The terms “review”, “analyze”, “requests”, and “disseminate” all appear to be functions of a cell that synchronizes. These functions border on the ability to “manage” airspace users, especially if the manager has little understanding of how the airspace users operate.

The need to have a collective knowledge of airspace user capabilities lends to the need for the managing airspace task to be shared. The BAO and the ADAM cell OIC can apply their knowledge and experience to make sure the capabilities are synchronized. However, splitting this responsibility between two staff elements has a downside as well. With no single individual to receive, analyze, and make recommended changes to airspace control, issues may be overlooked, bypassed, or delayed. This most likely why the BAO is named “the airspace control officer for the brigade S-3” in Field Manual 3-52 (Airspace control 2013).

This has major implications on the responsibilities of the ADAM cell OIC. This would eliminate the need to train the management and integration of the other airspace users. That job is now the sole responsibility of the BAO. As the airspace control officer, the BAO is responsible for management of the airspace at the brigade level alleviating many of the shared responsibilities from the ADAM cell. This should reduce competition between the cells and synchronize effects for the commander. Only in units without the BAE does the ADAM cell take over the responsibilities of the shared functions. In all other BCTs, the ADAM cell becomes one of several other key members vying to employ assets to support the BCT (Airspace Control 2013). According to one section of the ADAM cell operations publication, the AMD personnel provide the BAE with the common operating picture so that the aviation personnel can provide the Airspace Command and Control (AC2) functions (ADAM Cell Operations 2013).

Figure 2 depicted what the ADAM cell must be able to do. Figure 3 depicted what the ADAM cell may be required to do but must support. Figure 4 depicts what the ADAM cell does not do. The crosswalk from the ADAM/BAE mission roles to BAE

functions shows the majority of support comes in the form of planning, as it relates to the ADAM/BAE mission.

The BAE provides minimal functions to the C3I or Early Warning tasks in the ADAM/BAE mission. The tactical airspace integration system is the one piece of hardware that the BAE provides to enable interoperability to the multiple data links needed in joint operations with the Air Force.

While there is little support in the other mission tasks, the greatest comes from the planning of unmanned aircraft systems. This function is not a shared function with the ADAM cell. The BCT would employ not only rotary wing support but also unmanned aircraft systems in coordination with the BAO's recommendation. Through this function, the BAE has a tremendous responsibility to incorporate with the intelligence staff section to understand and coordinate their plan into use. The planning and incorporation of UAVs is not a role for the ADAM cell or their OIC.

ADAM/BAE Mission	BAE Functions
C3I	Plans and synchronizes aviation with the concept of operations
EW/SA	Advises and plans the use of unmanned aircraft systems, reconnaissance, attack, assault, air movement, sustainment, and medical evacuation
Manage Airspace	Standardizes brigade combat team unmanned aircraft system employment
AMD/Aviation Planning	

Figure 4. The cross-walk from ADAM/BAE mission to BAE functions

*Source:* Created by author.

*Note:* Solid lines indicated which mission tasks are directly accomplished by the functions of the cell. Dashed lines indicate mission tasks that are supported by the execution of mission function but do not accomplish the mission task.

The final step is to compare the tasks and functions that have been differentiated in figures 4 and 2 with those listed in the ADAM cell operations publication. The reader of both documents will find the distinctions made regarding roles in one are merged back together in the other.

The ADAM cell coordination officer, also known as the ADAM cell OIC, is the “senior AD planner, coordinator and briefer for the BCT” (ADAM Cell Operations 2013). Doctrinally, the position is held by a major but in his/her absence the AMD plans officer, a captain, assumes these duties and responsibilities.

What are the ADAM cell OIC’s responsibilities? Apparently everything the ADAM/BAE cell does. Specifically, the ADAM cell OIC must coordinate not only with

AMD units task-organized with the BCT, but also with “division and corps staff on all AC2 aspects” (ADAM Cell Operations 2013). This slightly contradicts FM 3-52, since it explicitly named the BAO as the single subject matter expert in this area. How can one individual coordinate outside the organization speaking for the commander not also have the commander’s ear on this matter when speaking inside the organization?

Continuing on, the ATP 3-01.50 does identify that ADAM/BAE cell is comprised of personnel with special area expertise to assist the commander and the staff in planning. From there on, the description of the ADAM cell OIC restates the same tasks as both the ADAM/BAE cell. This includes the tasks to provide AC2 of unmanned aircraft systems; a task already established as not in the hands of the ADAM cell.

Essentially, the description of the functions of an ADAM cell OIC, or the AMD plans officer, does not adequately provide a distinction between the BAO or the ADAM cell OIC. The only distinction in functions are explained in FM 3-52 but that document does not identify individual roles and responsibilities. The result is that in preparation for assuming the tasks and responsibilities of an ADAM cell OIC, the manuals alone do not provide clear enough guidance to be the sole educator.

The study must now address the main concern at hand. What is the desired capability of an ADAM cell OIC?

First, the study can establish clear responsibility of AMD planning, integration, and coordination. The ADAM cell OIC should be able to understand the capability and limitations of the C3I architecture. This will enhance their ability to plan the low-level sensor employment and be able to discern gaps in the common operating picture.

Second, the ADAM cell OIC may not execute, but should be prepared to act as the airspace manager. They should be knowledgeable of the effects airspace capabilities and users have on the ground maneuver force. Ideally, the ADAM cell OIC would need to know the airspace control measures needed to employ things like indirect fire, UAVs, and fixed and rotary wing assets. Armed with this knowledge, the ADAM cell OIC could be prepared to review airspace control measures if need.

Third, the ADAM cell OIC does not need to prepare to plan tactical employment of aviation, UAV, or positioning of forward arming and refueling points. These responsibilities are listed in ATP 3-01.50, despite being contradicted in an earlier paragraph and the airspace control manual.

#### Current Operating Environment

According to assessments from the training centers, many ADAM cell OICs lack the necessary expertise and competencies needed to properly employ the capability the ADAM cell provides (Futcher 2013). It can be assumed the OCs are basing these assessments from a doctrinal viewpoint of the competencies required. Similarly, this paper will utilize the identified skills, both ADAM and shared functions, to assess the current state. First, the study will look how the ADAM cells OICs are trained and prepared in the institutional domain. Second, it will look at the issues with the common use of ADAM cells in the operational domain.

The study will now address the training that ADA officers receive prior to their assignment as an ADAM cell OIC. There are two opportunities that ADA company-grade officers have to learn about ADAM cell operations. First is at the ADAM/BAE Cell Course run collectively by the ADA and Aviation branches at Ft. Sill, Oklahoma. The

second is at the ADCCC, also at Ft. Sill, Oklahoma. Currently, the ADAM/BAE Cell Course provides training in system operation as well as integration with Army aviation. The course is structured to offer essential skills to both enlisted Soldiers and officers by developing both separately during the initial phase, then bringing them together to simulate a working cell. The structure and composition of the course addresses issues like function responsibility, integration issues, C3I configuration, capability and limitations (ADAM/BAE Memorandum of Instruction 2013). This course does not discuss employment operations of AMD units that would be task organized to the unit. That focus would more likely come from the ADCCC rather than the technically focused ADAM/BAE course. That may be the only issue with the course structure. Attendance is a much greater problem with this course. For ADA company grade officers, selection as an ADAM cell OICs is not identified early enough for them to transition from ADCCC to the ADAM cell course. The current guidance from ADA branch managers at Human Resources Command is that only ADA officers who have successfully completed command or another key developmental position will be assigned to ADAM cells (ADA HRC 2014). The time then to attend this course would be in the transition period. Unfortunately, that does not seem to occur. What happens more often is that ADA officers are assigned to these positions without having attended the course (Corby 2008; Brown 2014). The reasons vary from not knowing about the course or immediate mission requirements such as impending deployments.

Since the ADAM/BAE course may not be feasible for a junior ADA captain to attend, they would then be dependent upon their knowledge gained from ADCCC. However, relying on experience and knowledge gained through ADCCC does not

provide an adequate level of preparation for assignment to an ADAM cell. ADCCC provides familiarization to the realm of airspace management for the ADA officer. It provides lessons on defense design and employment of AMD weapon systems that will aid in the AMD planning an ADAM cell OIC would be expected to do. On the other hand, the courses on air ground integration, air component integration, the air operation center, air tasking order cycle, and joint airspace control are an hour long and provide so much data that most students will not grasp the concepts required to employ ADAM cell systems effectively. Continued reinforcement is needed to become competent in these skills. At best, the student can expect to gain basic information but not the knowledge or understanding that is required of ADAM cell OIC. Furthermore, the course is so far removed in the ADA officer's assignment to an ADAM cell. Without the immediate reinforcement or phased refresher courses, the knowledge gained will atrophy. This further highlights the need for attendance in the ADAM cell course at Ft. Sill. The ADA branch does not have many jobs that would prepare ADA captains to assume the role as ADAM cell OIC. The skills needed to manage airspace and conduct detailed defense design for a BCT would limit the skills needed to very few individuals. Individually selecting officers with a background in either skill would create a stovepipe effect on the development of junior officers.

Now that the shortcomings in the instructional training domain have been identified, the study turns its attention to the growth opportunities in the operational domain. Often, the operational domain is where more specific, technical skills are learned. This would be a very advantageous environment for many company-grade ADA officers to be educated in the tasks required of an ADAM cell OIC. Unfortunately, due to

a mismatch of requirements and capabilities, ADAM cell OICs generally do not have that opportunity.

For starters, the level of air dominance in the current operating environment of Afghanistan and Iraq has precluded the need for extensive air defense coverage. Air dominance has become the norm for land operations. This allowed coalition forces to provide persistent intelligence and surveillance assets to provide the ground force with a great deal of intelligence before executing operations (Grant 2005). The adversaries in Iraq only utilized the air domain to attain moments of relative advantage with indirect fire. Very rarely was the Army's movement exposed by enemy use of UAVs and even then, the threat was not felt immediately. The Iranian UAV shot down in 2009 was a surveillance vehicle and posed only an indirect threat to the ground forces (Shadid 2009). The comfort in which the forces operated without an airspace threat predisposed the Army from being concerned about maintaining a counter air capability.

The lack of a legitimate threat and the capability to counter that threat is only the start of the problem in the current environment. The more pressing need to focus on airspace management of friendly forces became the premier focus of the ADAM cell. The preponderance of airspace users in operations in Iraq and Afghanistan were friendly forces, which made maintaining situational awareness of airspace users the most difficult task. The predominant threats were airspace collisions, near misses, and fratricide from indirect fire traversing the airspace.

Friendly airspace users can be rolled into two focused capabilities. First is an offensive operation with air weapons teams, close air support, indirect fires, and air

movement. Second are passive defensive measures such reconnaissance, surveillance, and early warning.

It became routine that airspace management at the BCT level fell to the element with the preponderance of users in the airspace at any given time (Sweet 2009). At echelons above division, the joint community resolves the same issue of airspace domain responsibility through the implementation of command and control. Joint doctrine allows the flexibility to place the control of airspace under the organization with the “preponderance of forces to be tasked, and the ability to effectively plan, task and control joint air operations” (Joint Chiefs of Staff 2014). That transition is a logical reaction to similar situation. A brain surgeon would not dictate how and where a heart surgeon should operate, especially if there is nothing wrong with the patient’s brain. Likewise, for an ADA officer to dictate to an aviator how and where they will fly does not make much sense, especially when there is not a threat, as stated before, or no friendly assets that can affect the aviator.

The primary airspace users become air weapons teams; indirect artillery fire; intelligence, surveillance, and reconnaissance platforms; and nearly every asset of the United States Air Force. Even without air defense assets, the remaining users vie for control and management of the airspace. Doctrine dictates that the management of the airspace at the brigade level belongs to the ADAM/BAE cell to alleviate competition and synchronize effects for the commander.

Because there is no threat, there is no need for ADA assets. Without an asset, there is no “seat at the table”. There is no need for any other proponent to divest their interests to another member of the staff who does not understand how to employ those

capabilities. The asset does not need to be a weapon system, but it does need to enable the prosecution of the battle to some extent. This is the current situation with the ADAM cell. Each ADAM cell currently contains the means to integrate into an existing air common operating picture, providing updated airspace control measures and real-time location of aircraft in flight. Other radar assets in the area that are not owned by the BCT provide this information to the ADAM cell systems. Because of that structure, the picture is incomplete. It cannot provide the granular detail or persistent vigilance capable of identifying threats in order to conduct passive air defense. The divestment of active defense assets directly affects the real-time projection of friendly assets (Corby 2008; Fitch 2006; United States Army Operating Concept 2010). Arguing for the need of active air defense capability is a concern for another research paper. What is most concerning is the level of training company-grade officers receive, thus preparing them to make use of the information the systems found within the ADAM cell.

The ADAM cell OIC did not perform the job of an airspace manager and the cell was only the conduit in which a common operating picture was presented. Often the ADAM Cell OIC is tasked to perform another job that is mission essential (Sweet 2009). The warrant officer and the enlisted personnel were fully capable of conducting system integration and then monitoring the airspace. Planning, coordination, and management fell to the aviation officers who had the personnel traversing the domain, the preponderance of assets, and the capability to provide tangible results to the BCT commander.

### Framing the Problem

The sections on the desired and current environments should have made it clear that there are four predominant issues. First is the issue of doctrine clarity. The divided tasks of the ADAM and BAE cells makes it difficult to identify who is in charge and when. The specialty skill tasks are easy to clarify, but the question remains on who should manage the airspace and when.

Second, institutional training opportunities for ADA company-grade officers are almost unavailable. The broad stroke development at ADCCC and the lack of emphasis on attending ADAM cell courses prior to assignments does not prepare ADA captains to enter a new and different environment. As alluded to before, if the intent remains to not stovepipe a specific skill set, such as short range air defense vs. high and medium range air defense, then preparing officers before assignment becomes especially important.

Third, the lack of an air and missile defense threat reduces the need to train, rehearse, and develop those skills in an ADAM cell OIC. Very few threats in the current environment have a direct impact on the execution of a BCT's mission. Threats of tactical ballistic missiles would be planned at a much higher level and the incorporation of such assets into BCT formations for anything other than tactical movement are unlikely.

Fourth, the role of the ADAM cell OIC as an airspace manager is not likely to occur when they do not have a substantial role in the execution of airspace operations. A cell that plans against no threat with no assets does not get to manage the operations of other warfighting functions with capabilities that provide direct effects on the battlefield.

## Friction of the Doctrine for Airspace Management

The competency of an ADAM cell OIC is measured by their ability to accomplish their doctrinal tasks. Doctrine is mostly consistent in tasking the ADAM cell OIC as responsible for managing the airspace for the BCT (Department of the Army 2013a; ATTP 5-0.1 2011). The one contradiction is found in Field Manual 3-52 that identifies the BAO as the airspace control officer for the brigade S-3 (Department of the Army 2013b). This raises a couple of issues with the doctrine for airspace management. They are: what does a airspace manager airspace do and whose responsibility does the function truly belong to?

The term management implies a full range of responsibilities, capabilities, and authorizations that simply do not exist or are not feasible to be completed at the BCT level with regard to airspace. Air Force assets that traverse the airspace of a BCT are synchronized at a much higher echelon when the air tasking orders are created. The ability for anyone at the BCT level to alter flight paths or hinder air operations is very slim. The actual practice of airspace management is primarily synchronization and integration. With a disparate amount of assets with as many different tasks traveling above the BCT area of operations, it becomes the manager's job to deconflict airspace usage prior to operations as part of the plans process. This changes in dynamic operations when more interaction within the Army Air-Ground System as well as the Theater Air Control System. Essentially the actions are integration and synchronization, which are the responsibility of the S-3. The responsibility is then delegated to the ADAM/BAE cell to manage (Department of the Army 2013a; Department of the Army 2013b). Because of the difficulties, ADAM cell OICs can quickly be relegated to monitor status rather than

participate as active planners (Futscher 2013a). The terminology is confusing and can have consequences that raise expectations unnecessarily.

The second question about who is in charge raises more concern. As stated before, the ADAM cell and BAE are understood to be nearly synonymous with one another, but they represent two very separate entities. While each is responsible for tasks unique to their branch, they must share responsibilities such as planning and analyzing airspace use and reviewing, requesting, maintaining, and disseminating airspace control measures. The BAO according FM 3-52 is the individual who advises the BCT commander on all things AC2 related (Airspace Control 2013). Meanwhile, ATP 3-01.50 identifies the ADAM cell OIC as having that responsibility not only to the unit but outside of the organization as well.

#### Friction of the Enemy Airspace Domain

The lack of a robust air threat by a potential adversary in any recent war does not provide enough evidence to necessitate a change in the composition of the BCT to include ADA assets. The current air defense threat consists of rockets, mortars, and UAVs. The Army does not currently have assets capable of maneuvering with and defeating threats in the current environment. The lack of those advanced systems along with any traditional systems within the organization prevents the ADAM cell OIC from being utilized as an air defense planner. It does not take special skills to produce an annex that identifies passive air defense measures. It is for that reason; ADAM cell officers are utilized in a variety of other tasks.

Currently, when Avenger units are attached to BCTs during training center rotations, the opposition force will employ the use of rotary wing aircraft to exercise the

ADAM cell function. The problem is that there are too few Avenger units for every BCT to incorporate this into their training plans. This creates the problem of the haves and have nots. Some ADAM cell OICs will have this opportunity while others will have to do without and revert to their additional duty roles.

#### Friction of the Integration of Airspace Users

The ADAM cell has no organic asset that utilizes airspace. As a result, their responsibility to the BCT becomes more about communication. This exacerbates inherent problems with integration on combined arms staffs. Each warfighting function develops capabilities that allow it to better execute mission requirements and meet specific required capabilities independent of other warfighting functions. The capabilities each Army branch develops are less effective alone and the best results are achieved when they are synchronized and integrated.

Unfortunately, that is not an easy battle to win. Army aviation officers and ADA officers in ADAM/BAE cells point to infighting as one of the problems with the previous two major setup in the ADAM cell (Sweet 2009; Corbari 2009). Removing the ADA major from the ADAM cell and keeping the ADA captain alleviated one problem, but it was replaced by yet another.

An ADA captain on a BCT staff has little influence with the majors who have attended Command and General Staff College or some other combined arms institutional training environment. This presents a difficult problem for the ADAM cell OIC who doctrinally is responsible for managing the airspace for the BCT. This problem was also addressed by assigning only senior ADA captains to the position. The concept was to limit the gap of experience from six years to two or three. While the experience level may

be greater, the issue is now level of competency, given issues with specialized training outlined before.

The issues of rank structure, confidence levels, and general knowledge of ADA systems appear to be the problems that were addressed when the decision was made to assign only senior ADA captains as ADAM cell OICs. What was lacking in the solution was developing competence. Junior and senior captains work on BCT staffs in other sections. Their competencies validate their utility. The same should be true for ADAM cell OICs.

In practice however, the airspace manager tends to be the individual with the preponderance of assets in the airspace. In most cases, that would be the BAO in the BAE. Assigning them as the airspace manager was logical since the greatest airspace threat was fratricide or collision with another airspace asset. It would be a simple process if Army aviation were the only element with assets in the BCT airspace. As figure 3 depicts, the manager also has to take into consideration the military intelligence collection assets, the artillery rounds, and any potential Air Force asset that would need clearance below the coordinating altitude. Depending on the mission or task, the manager is required to synchronize the effort of all these assets. The airspace manager must have a clear understanding of each asset's capabilities and their importance to the mission. As an Aviation officer, readily trained in providing effects and fire support to the maneuver element, the knowledge and understanding is ingrained throughout their development. Thus by the time an Aviation officer is assigned to a BCT, integration is near seamless because the officer is more familiar to the operational capabilities available. Again, due to the lack of a legitimate adversary, systems that provide passive

data about the airspace, and under-developed competencies, the ADAM cell OIC has nothing other than their own gravitas to prove themselves useful to the BCT staff and command.

Continuing this trend does not enable decentralized operations, cohesive staffs, or the development of experts. A better groundwork for the development of ADAM cell officers, the lynchpin to air defense at the tactical level, needs to be created if the ADA branch is earnest about preparing for the future environment where SHORAD batteries are capable of conducting decentralized operations. Building cohesive units with organic air defense elements prior to 2020 is not feasible given the current drawdown and fiscal constraints. The ADAM cell was developed partly to mitigate that risk. Unfortunately, the capability is withering because of a lack of proper preparation to ensure the ADAM cell OIC is prepared to be valuable in their airspace management competencies. Experts in the realm of airspace management are needed at the BCT level. The authorities may not extend above the coordinating altitude, but knowledge of how the multiple entities support the maneuver commander's mission is vital. This is not a place for individuals to receive their first glimpse of how a unit conducts a combined arms fight.

#### Friction of Institutional Training

There is a clear need for ADAM cell OICs to attend the ADAM/BAE Air Ground Integration course. A comparison of the instruction provided by the both course shows the shortfalls in the ADCCC to prepare company grade ADA officers to serve as an ADAM cell OIC. Table 4 shows the course instruction for the ADAM/BAE Air Ground integration course minus the operator courses. There are 18 lessons found in the ADAM/BAE course that are not discussed in detail in the ADCCC. Even lessons that do

correlate from one course to the other do not indicate the lessons are the same. This is the case with the Theater Air Control System (TACS) and the Army Air-Ground System (AAGS) lessons. The focus for the TACS/AAGS lesson in ADCCC is on the air defense contributions to the system such as the air defense fires coordinator, whereas the ADAM/BAE course provides much more detail on the joint air request network for close air support. Both are aspects of TACS/AAGS but one area is emphasized over another, depending on the course structure and focus.

Table 4. Comparative list of ADAM/BAE course and the ADCCC

ADCC			ADAM/BAE Air Ground Integration Course		
		process			
			Doctrinal foundations [Unified Land Operations]		
			Fratricide Avoidance		
			ADAM Cell		
			Sentinel Capabilities and Limitations		
			Air and Missile Defense Design		
			Avenger/Stinger Capabilities		
			C-RAM Capabilities and Limitations		
			Joint Airspace Control		
			USAF Overview and AMD Integration		
			TACS / AAGS		
			Joint Theater Air Operations (JTAO)		
			Joint Air Tasking (ATO) Cycle		
			ATO/ACO Development		
			AMD Considerations in IPB and MDMP AMD Orders and Annexes		
			The military decision making process		
Introduction to ADAM/BAE		X			
Aviation Operations					
Sense and Warn		X			
AMD Operations			X X X		
Airspace Control Measures	X			X	
Aviation Reconnaissance and Security Operations					
Assault Helicopter Operations					
Air Assault Planning					
AMCM/AMB					
JAAT					
Aero-Medical Support/Evacuation					
TACS/AAGS				X	
Joint Doctrine and Operations				X X	
JAOC/BCD					X X
MTACS/MACCS/SO AGS					
CRC/TAOG					
Joint Air Support Requests				X X	
AMD Planning					X
Joint Fires Support					
ADAM/BAE Critical Tasks					
Airspace Control Collective Tasks					X
CAPSTONE Final Practical	X X X				X
TAIS Overview					
AC2 Interoperability					
System Integration					

Source: Created by author.

Training competency does not solely occur in the institutional domain of leader development. The operational and individual domains must share an equal load to provide experts in the field of airspace management. As stated before, the institutional domain, in this case the ADCCC, is responsible for preparing company-grade ADA officers for the next six years of their career in a number of assignments and situations. At best, the course can provide familiarization with aspects of air-ground integration, Air Force capabilities and structure, and air control systems. Further training at specialized courses such as the joint firepower course provides a better forum. The issue is this course is not emphasized. Instead, schools that focus on ADA branch core competencies such as air battle management and defense design have greater emphasis. Competencies can also be better enabled by emphasizing other institutional training, not just prior to assignments as ADAM cell OICs, but as part of the typical development.

The operational domain is equally responsible for preparing leaders to assume their next duties. This extends beyond preparing for battery command, but includes preparation to serve in many other facets of the ADA branch and the Army. With that in mind, training and education should provide exposure and practice with airspace integration and synchronization. The friction here is time and the need for expertise in their assigned mission. After a rash of fratricides in 2003 resulting in the death of three coalition pilots and the destruction of a Patriot radar, greater emphasis was placed on developing experts. The fault was identified as system error bypassing several fail-safes, to include the human-in-the-loop. A disproportionate amount of trust in system data was cited as one of many faults. As a result, more emphasis was placed on developing experts rather than trained operators (Hawley 2009). Furthermore utilization of the air and

missile defense workstation and other data link assets within an ADAM cell are not skills developed in traditional jobs for ADA lieutenants and junior captains.

At this point, the competing interests should be clear. How can one branch train the same individual to be an expert in two separate systems at the same time? One will suffer at the expense of the other, or both will be partially trained.

#### The effect of the current solution

The solutions developed over the course of ten years from the implementation of the ADAM cell addressed immediate issues—Band-Aid fixes to a wound requiring a suture. Assigning a major and a captain provided jobs to the large amount of officers without SHORAD battalions after modularization. After the number of majors began to fall and it became clear the ADAM cell OIC and planner were not being utilized as ADA officers, the major slot as well as the key developmental credentials were removed. When the problems of performance, skill, and knowledge became issues, senior majors were chosen to be the population from which assignments to ADAM cells were drawn.

Each of the solutions above was a reactive solution providing temporary fixes, rather than proactive solutions geared toward an end state beyond two years. Each solution created additional problems that required further refinement. As a result, the organization that once was seen as a future staple and new frontier for the ADA branch (Jassey 2004) has now become a section of the BCT that has been relegated to additional tasks struggling to establish its place in a BCT.

There will be no benefit added to the ADAM cell maintaining the current solution to assign senior captains as ADAM cell OICs. The ADAM cell will remain that post-command job that will either be a rewarding experience with little benefit to expanding

the role of air defense or the assignment that is just a waypoint before attending Command and General Staff Officer College. The Army is emphasizing the best and brightest get assigned to broadening assignments like advanced civil schooling or strategic, joint, interagency, intergovernmental, and multinational environments (ALDS 2013). In contrast, the message from ADA branch managers is that the best and brightest go to ADAM cells. The messages are not consistent with one another.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### Conclusions

This study used qualitative analysis of multiple sources of data to answer the primary research question, “does the ADA branch prepare ADA captains to manage the airspace domain within the BCT with the current organization construct and lack of new systems given the training, operational, and institutional constraints?” The research looked at the origin and development of the ADAM cell how it evolved and the current challenges that face the ADAM cell OIC. The findings showed that ADA branch could not prepare ADA captains to manage airspace without a substantial change in focus from their current role in the employment of air defense weapons systems.

The research is persuasive because it draws the conclusion from an assessment of all published data regarding the current operations of an ADAM cell, the doctrine that governs both the cell and airspace operations, and personal accounts made by both BAOs and ADAM cell OICs. Secondly, the analysis methodology differs from other papers by using the Army’s design methodology to determine what problems exist across the full spectrum of the issues at hand and help identify a solution that addresses as many of them at once. The desired end state was one that took into account the intended purpose of the ADAM cell without regard to parochial concerns.

The final recommendation is to remove the ADAM cell OIC from the BCT force structure. This is a unique perspective that has not been put forth as a solution to date. The recommendation is in light of the evidence from the research and is in the best interest of the Army and Soldiers who would otherwise serve as an ADAM cell OIC.

This chapter will explain how the author came to that conclusion by refining the friction points into clear issues. After the review, the author will make a recommendation and explain why other options are cost prohibitive in order to further advance the recommended solution.

### Rationalization

The multiple friction points identified in chapter 4, while minor issues on their own, combine to create a serious problem for the ADA branch and the Army. The points of friction identified from chapter 4 are: a lack of doctrinal clarity, a lack of a direct and immediate air threat, the underutilization of doctrinal constructs by BDE staffs, and competing training requirements in the development of a company grade ADA officer.

First, the issue of doctrinal clarity creates a work relationship ripe for discord among between the ADAM cell OIC and the BAO. According to FM 3-52, the BAO is the senior advisor for all things AC2. However, the very same document then identifies the function of Airspace management as a shared responsibility for both the ADAM cell OIC and BAO. ATP 3-50.1 then identifies AC2 as an ADAM cell OIC responsibility. Aside from the special skills the BAO and the ADAM cell OIC bring to a BCT, there is a lack of clear guidance for their relationship. It is not clear when the ADAM cell OIC would be fully responsible for the management of airspace, if at all.

Second, the lack of a direct and immediate air threat limits the utility of the ADAM cell OIC as well as access to available assets for training. A natural trade-off occurs when an opposing force no longer presents a specific capability as a threat. In this instance, the lack of an enemy air force in the most recent conflicts involving the United States requires an equal response. The trade-off is the reduction of SHORAD forces in

the unit of action or BCT. The majority of short-range air defense capability was shifted to the reserve force. The lack of a threat and, as a result, reduction of assets to defend against that threat has nullified a key task and responsibility of the ADAM cell OIC. The remaining responsibilities, establishing a common operating air picture fall more heavily into the lap of the ADAM cell warrant officer.

Another reaction to the lack of a direct and immediate air threat is limiting of on the job training opportunities for ADAM cell OICs. Because there are so few active component SHORAD units, the amount of cooperative training events are limited by BCT mission analysis, proximity to SHORAD units, and timing. Many BCTs may be regionally aligned and be provided missions to areas with no air threat; therefore, that capability will not become a critical task requiring training prior to employment. Because of this, the ADAM cell OIC could spend three years not conducting any air defense specific capabilities. Even if BCTs are assigned missions where the analysis requires air defense training, the majority of BCTs are not colocated with SHORAD units. The ability to conduct cooperative training events prior to culminating training events will need to be done completely through virtual, simulated, or constructive means. Lastly, the few SHORAD units remaining in the active component means more reliance on reserve components, adding the challenge of timing to the training plan. These issues complicate training opportunities, which further aggravate the next friction point.

Third, the struggle to gain consensus among airspace users to abide by doctrinal constructs provides opportunities for the misappropriation of the ADAM cell OIC. This issue is focused on the logic BCT operations officers apply when presented the previous to friction points. Because doctrine is not clear, the BCT operations officer must delineate

responsibilities by relying upon capability, referential power, and strength of personalities. In the case of the ADAM cell OIC, the same scenario was seen regardless of how the assignment structure was divided out. When ADA majors were assigned, the competition between two majors was a distraction to the mission. When junior captains were assigned, they were often reassigned to other missions, mostly due to a lack of core competency as well as relevancy to the mission. Now, senior captains are assigned, and are subordinate to the BAO, not as depicted in some portions of doctrine as being equal with shared responsibilities. Distinct responsibilities would have aided in each of the scenarios.

Finally, the issue of inadequate training management allowed for the previous issues to perpetuate over the last ten years. Providing adequate training could have alleviated much of the problem. Competing training requirements and throughput in institutional domain short changes company grade ADA officers. The focus of ADCCC is too broad to provide the focused training needed for ADAM cell OICs. The lack of emphasis on the ADAM cell course shortchanges ADA officers and inadequately prepares the ADAM cell OIC for their duties. ADA captains need to attend the ADAM cell course prior to their assignments to ADAM cells. However, shifting from junior captains to senior captains presents a force flow problem. Attendance by ADA captains has been low in the past and will likely continue to remain low without emphasis from branch managers and leaders.

### Recommendations

This paper recommends the ADAM cell OIC be removed at the BCT level, augment active and reserve component SHORAD batteries with liaison elements, and

maintain the ADAM course for 14G and 140E warrant officers. The function of airspace management should be conducted solely by the BAO with support from the ADAM cell warrant officer to produce the common operating air picture. Augmentation should be given as needed in a resource-constrained environment.

This gets at the root cause of the problem. The approach is similar to the reasoning behind the reduction of the active component SHORAD force. If a capability is unnecessary in the immediate and foreseeable future, remove it from the primary unit of action, place it in a secondary unit, and develop as needed. Now, how does this solution resolve the several previously identified issues?

First, the removal of the ADAM cell OIC will clarify responsibilities of airspace management within the BCT. The BAO would now have unmitigated control of the airspace and work in concert with the Fires cell, Tactical Air Control Party, and the S2 as is codified in doctrine already. The struggle within the staff for dominance and responsibility will no longer be present. This would necessitate a change in the moniker of air defense and airspace management to just air defense, but would be more descriptive of the way the current operational environment works.

Second, rather than force an ADA captain to herd the warfighting functions that utilize airspace, it would be more advantageous to focus on core strengths and capabilities. The ADA warrant officer is the central figure in establishing the airspace common operating picture. Those warrant officers are perfectly capable of planning the low-level air picture and producing basic air defense annexes. The majority of the ADAM cell functions can be, and for the most part already are, conducted by the ADAM cell warrant officer.

Third, augmenting existing SHORAD units in both active and reserve components with air defense liaisons to perform when a threat does present itself, the BCT will receive augmentation from either an AMD battalion or a reserve component SHORAD unit. A liaison element can reside in those units until they are attached to a BCT. The liaison could be a separate entity or an additional requirement for the battery commander or battery executive officer, similar to how previous generations accomplished the same mission. That liaison would have responsibility and receive training on how to develop a synchronized air defense plan. There is no one better to develop the air defense plan than the person who understands the capabilities and constraints of the unit executing the mission.

Finally, there are very few training adjustments required to accomplish this task. SHORAD defense design is already one of the primary skills taught in ADCCC and is part of the mission essential tasks for all SHORAD units, so on the job training will aid in keeping these skills current. The ADAM Cell Course at Ft. Sill will continue to support the warrant officer and the enlisted personnel. Unlike the ADA officers, these Soldiers have a career track that limits them to assignments in ADAM cells at brigade and division levels or SHORAD units.

This solution is simple and attains the desired goals initially set out in the development of the ADAM cell.

#### Alternatives not recommended

Dividing the issues and addressing them one at a time will waste time and limited resources. The issues listed in the conclusions pose tremendous challenges for the Army as a whole. The individual fixes would require adjustments to doctrine and agreed upon

by at least two branches, realignment of SHORAD capabilities into the BCTs, and a substantial effort to train ADA captains how to manage several warfighting functions in a finite airspace.

Adjusting the ADCCC curriculum to develop ADA officers who have an extensive level of knowledge of all airspace users and how to synchronize and manage them in order to accomplish the ground commander's mission will require extensive study time. Adding this to the curriculum will force out other learning objectives, many which are needed by students in order to prepare them for their follow-on assignments. Keeping that level of instruction at the ADAM cell course will require every company grade officer to attend the course prior to assignment as an ADAM cell OIC. This will create a large synchronization effort to line up every ADAM cell OIC change out with a course in order for TDY-enroute orders to be cut. Even with the expense of mandatory training for every ADAM cell OIC, it will not be guaranteed to be effective. Since 2008, the recommendation to send ADAM cell OICs to this course has been made and not much has changed.

The effort to change focus from engaging enemy air threats to managing all airspace traffic is a monumental leap and would require very specific training to be able to accomplish this task. The assignment and capability is absolutely necessary, but it is one that the ADA branch did not prepare captains to conduct, nor is it cost effective to do so without creating a specific developmental track to do so.

Shifting responsibility of airspace management to either the BAO or the ADAM cell OIC will provide only a temporary solution. As stated before, the education needed to prepare ADAM cell OICs to manage airspace would be intensive. Shifting all those

responsibilities permanently to the BAO will leave the ADAM cell OIC with very little on his or her plate and ripe picking for additional duty officer taskings.

Think of the ADAM cell as a car. Small issues pop up here or there and the individual cost to repair them is not expensive. Over time however, those small repairs add up and cause unforeseen problems in other areas. Rather than replace individual pieces and parts adding to the overall cost of the vehicle, it becomes more prudent to replace the whole with a fully assessed alternative—one that meets the driver's needs at an affordable price.

#### Follow on Study

Current capability trends foretell a complex future airspace domain. The growth of airspace domain complexity will require more robust air-ground integration capabilities, procedures, along with competent individuals to integrate airspace effects. The last recommendation touched briefly on the potential future. The presence of an increased threat would substantially alter the skills needed for ADAM cell officers. The rise of UAVs as a legitimate threat without a viable solution would necessitate the incorporation of an AMD unit into the BCT.

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